

KARYOTAXONOMIC STUDIES ON WILD ECUADORIAN TUBER-BEARING
SOLANUM, SECT. *PETOTA*

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ABSTRACT

A taxonomic and distributional summary is presented for the tuber-bearing potatoes of Ecuador.

KEY WORDS: *Solanum*, Solanaceae, Ecuador, karyotaxonomy

After the recent monographic publications on Bolivian potatoes (Hawkes & Hjerting 1989; Ochoa 1990), the tuber-bearing *Solanum* from Ecuador are some of the least known in sect. *Petota*, subsect. *Potatoe*. In the present paper, the author gives a brief summary of the Ecuadorian wild potato species as a result of his explorations and field works made in Ecuador, as well as his observations of living plants in CIP's experimental plots, and laboratory research. Exceptions, however, are *S. baezense* Ochoa (series *Conicibaccata*), *S. andreanum* Baker, and *S. serratoris* Ochoa (series *Tuberosa*), of which I did not have living material. Likewise, although I have made some herbarium collections, I have not included in this treatment and will not include in any of my further work, *S. juglandifolium* Dun. and *S. ochranthum* Dun. (series *Juglandifolia*).

Data given are mainly on the morphology of the species, habitat, geographical distribution, and my determinations on the chromosome number ($2n$) and the Endosperm Balance Number (EBN).

These studies have also been complemented by examinations of exsiccatæ collected in the past by other authors and presently housed in European, and North and South American herbaria.

The wild tuber-bearing species studied here have been taxonomically grouped in series. If identified synonyms are known, these are given for each species.

- I. *Solanum* series *Acaulia* Juz., Bull. Acad. Sci. U.R.S.S., ser. Biol. 2:316. 1937 (*nom. nud.*); *ex* Buk. & Kameraz, *Bases of Potato Breeding*. 21. 1959.

Solanum albicans (Ochoa) Ochoa, *Phytologia* 54(5):392. 1983. BASIONYM: *Solanum acaule* Bitt. var. *albicans* Ochoa, *Agronomía*, Lima 27:363-364. 1960. *Solanum acaule* Bitt. subsp. *albicans* (Ochoa) Hawkes, *Scott. Pl. Breed. Rec.* 117. 1963.

Plant small, rosette, short stem, very hairy, white hairs. Leaves 3-4 pairs of leaflets without or with few interjected leaflets. Corolla rotate, white or violet. Tubers round to elongate, 2-3 cm long, white.

Distribution: This species was found for the first time in Atocsaico, located in the Jalcas of Porcón at 3450 m alt., Province and Department of Cajamarca, northern Perú. Collections in Ecuador were made in Cerro Quilua, 3600 m alt. in route from Cerro Colorado to Carihuayrazo, Province Chimborazo and in Romerillo, ca. 3900 m alt., Canton Ambato, Province Tungurahua, under the V.n. of *Curiquinga*. Both collections have, as do the Peruvian *Solanum albicans*, $2n = 72$ chromosomes and $EBN = 4$. This species is highly resistant to frost (-5°C).

- II. *Solanum* series *Concibaccata* Bitt. in DC., *Prodr.* 13(1):33. 1852.

Solanum albornozi Correll, *Wrightia* 2:178-179. 1961.

Leaves with numerous interstitial leaflets and (4-)5-6 pairs of folioles shortly petiolulate, glabrous or glabrescent, dark green and subvernigose above, puberulent in the lower surface, margins slightly revolute. Corolla rotate-pentagonal, white above, white with a pale violet strip on the back of each petal. Berry typically long-conical. Chromosome number: $2n = 24$, $EBN = 2$.

Distribution: So far it is collected only on the route from Loja to Catamayo, 2300-2600 m alt., Province Loja, Ecuador; mostly in humid thickets or bushes.

Solanum calacalnum Ochoa, *Darwiniana* 23(1):227-231. 1981.

This rare species is principally characterized by its small branched plant, very long stolons (1.5-2.0 m); small tubers 2-4 cm), white, oval to round. Leaves glabrous, 3-4 pairs

of leaflets with long petiolules (15-20 mm), 0-1(-2) pairs of interjected leaflets. Corolla rotate to rotate-pentagonal, very showy, large (4 cm). Berry long-conical with obtuse apex, 2.5 cm long. It is very susceptible to the attack of *Phytophthora infestans* and to the potato leafroll virus (PLRV). Chromosome number: $2n = 24$.

Distribution: Very restricted, so far it has been found only on Mount La Sirena, 3000 m alt. and Sillacunga, 2900 m alt., a few km from Calacali, Province Pichincha, on slopes of stony soil, with very poor vegetation.

Solanum colombianum Dun. in DC. Prodr. 13(1):33. 1852.

Solanum colombianum Dun. in DC. var. *trianae* Bitt., Fedde Repert. Sp. Nov. 11:382-383. 1912.

Solanum dolichocarpum Bitt., Fedde Repert. Sp. Nov. 12:4-5. 1913.

Solanum colombianum Dun. in DC. var. *trianae* Bitt. f. *quindiense* Buk., Suppl. 47, Bull. Appl. Bot., Genet., Pl. Breed. 225-226. 1930.

Solanum colombianum Dun. in DC. f. *zipaquiranum* Hawkes, Bull. Imp. Bur. Pl. Breed. & Genet., Cambridge. 112. 1944.

Solanum colombianum Dun. in DC. var. *meridionale* Hawkes, Bull. Imp. Bur. Pl. Breed. & Genet., Cambridge. 112-113. 1944.

Solanum filamentum Correll, Wrightia 2:174-175. 1961.

Solanum caquetanum Ochoa, Phytologia 46(7):495-497. 1980.

Although the type locality of *Solanum colombianum* is Tovar, Estado de Mérida, Venezuela, in the time of Dunal, author of this species, the present territory of Venezuela, Colombia, and Ecuador were integrated under one nation named La Gran Colombia; hence the epithet of *colombianum*. This species has 3-5 pairs of leaflets and 2-4 (-6) pairs of interjected leaflets. Corolla rotate to rotate-pentagonal, white to light bluish or to light purple. Tubers usually long-cylindrical or subcylindrical, up to 8 cm long and 2 cm thick. Berries long-conical to ovoid-conical, 3.5 cm long.

En route from Leito to Río Chico, Cordillera de Los Leones, Province Tungurahua, at 2870 m alt., in the edges of woods and shrubs, I found an abundant colony of *Solanum colombianum* ($2n = 48$) locally called *Papa de Monte* which must have great resistance to the attack of *Phytophthora*

infestans. Its leaves showed a type of hypersensitive reaction proper for hosts with the major genes of resistance (*R*) against late-blight. Small areas with cultivated potatoes in the vicinities, on the contrary, were almost destroyed by this fungus. Chromosome number: $2n = 48$, EBN = 2.

Distribution: More in Colombia than in Venezuela or Ecuador, especially in the provinces of Cundinamarca and Boyacá. In Ecuador, the author found this species mostly in Tungurahua Province. Living in cloud forest at 2500-3500 m alt.

Solanum chomatophilum Bitt. f. *angustifolium* Correll, *Wrightia* 2:180. 1961.

Leaves 4-5 pairs of folioles and numerous interstitial leaflets. Folioles narrowly elliptic-lanceolate to lanceolate with subacute apex. Calyx asymmetric with longer lobes than the typical form. Berries ovoid. Resistant to *Phytophthora infestans*. Chromosome number: $2n = 24$, EBN = 2.

Distribution: Provinces Napo-Pastaza, Azuay, and Carchi, Ecuador, and the highlands of Department La Libertad, Perú, occurs at elevations ranging from 2500-3200 m alt., usually in cold and wet shrubby areas.

Solanum paucijugum Bitt., *Fedde Repert. Sp. Nov.* 11:431. 1912.

Plant dwarf and bushy, 20-30(-50) cm tall, sparsely pilose throughout. Tubers white, ovoid, 2-3 cm long. Leaves 2-3(-4) pairs of leaflets with (1-)2-3(-5) pairs of interjected leaflets, terminal leaflet much longer than the lateral. Corolla rotate-pentagonal, 2.5-2.8 cm in diameter, lilac to purple. Berries long-conical, light green with 2-3 vertical darker stripes, 2 cm long. Although it has some affinities with *Solanum flahaultii* from Colombia, both species are quite different in plant habit, leaf shape, and dissection and details of flowers. Chromosome number: $2n = 48$, EBN = 2.

Distribution: Central Ecuador, mostly in the provinces of Bolívar, Cotopaxi, Tungurahua, and Chimborazo between 3000-4000 m alt., in cloud forest, wet thickets and grassy slopes of páramos.

Solanum tundalomense Ochoa, *Ann. Cient., Univ. Agr., Lima* 1(1):106-109. 1963.

Plant usually very tall, 3-4 m high, branched very sparsely pilose. Tubers small, 3-5 cm long, white, ovoid to long subcylindrical. Leaves (3-)4-5 pairs of leaflets, (0-)2-5(-7) pairs of interjected leaflets, leaflets elliptic-lanceolate or narrowly elliptic-lanceolate with acute or acuminate apex. Corolla rotate, white or white with pale violet stripes. Berries long-conical, 3.5 cm long. Although this species has affinities with *Solanum colombianum*, I consider them to be different species. Besides the ploidy level, they have substantial differences both in the shape of the corolla and calyx morphology. It is resistant to *Phytophthora infestans* but very susceptible to *Synchytrium endobioticum*. The chromosome number, cited formerly by the author for *Solanum tundalomense* (see Ochoa 1972, p. 75) as $2n = 24$, unfortunately was mistyped. Counts made in more than 20 accessions of *Solanum tundalomense* from Ecuador have given $2n = 72$, EBN = 4.

Distribution: Widely distributed in Ecuador (in 10 of 20 provinces) with the highest concentrations in the provinces of Azuay and Cañar, occurs at elevations between 1900-3600 m alt. In shrubby and forest vegetation.

III. *Solanum* series *Olmosiana* Ochoa, An. Cient. Univ. Agr. 3:33. 1965.

Solanum olmosianum Ochoa, An. Cient. Univ. Agr. 3:34-37. 1965.

So far, this is the only representative species of the series. Its main morphological characteristics are the shape and dissection of the leaf, 1-3 pairs of leaflets, the irregular and wide wings of the rachis extended all the way down to the petiole, leaves glabrous, corolla deeply stellate and white-cream, 2.0 cm in diameter, tubers white, oblong, 2-3 cm long, usually smooth. *Solanum olmosianum* was found for the first time in the margins of Olmos River, near El Sauce at 1640 m alt. in the Province and Department of Lambayeque, Perú. However, I have also found it in Tabla Rumi, at 2500 m alt., in the Province of Loja, Ecuador. The two mentioned collections have $2n = 24$ chromosomes, EBN = 2.

Distribution: Ecuador and Perú, in the lower inter-Andean valleys between 1600-2500 m alt., in shrubby thickets.

IV. *Solanum* series *Tuberosa* Rydberg, Bull. Torrey Bot. Club 51:146-147. 1924. *nom. nud.*

Tuberosa (Rydberg) Buk. (*sensu stricto*), ex Buk. & Kameraz, *Bases of Potato Breeding*. 18. 1959.

Andigena Buk. ex Buk. & Kameraz, *Bases of Potato Breeding*. 24. 1959.

Transaequatorialia Buk. ex Buk. & Kameraz, *Bases of Potato Breeding*. 21. 1959.

Vaviloviana Buk. ex Buk. & Kameraz, *Bases of Potato Breeding*. 18. 1959.

Andreana Hawkes, Bull. Imp. Bur. Pl. Breed. & Genet., Cambridge. 2:50. 1944. *nom. nud.*

Minutifolia Correll, Texas Res. Found. Contrib. 4:216-218. 1962.

Solanum burtonii Ochoa, American Potato J. 59(6):263-266. 1982.

Plant to near 1 m tall, sparsely pilose throughout. Tubers white, 2-3 cm long, ovoid. Leaves, 3-4 pairs of orbicular interstitial leaflets. Leaflets rugose, cordate at base, shortly petiolulate, terminal leaflet broad ovate to elliptic-lanceolate. Corolla rotate, small, 2 cm in diameter, light purple-lilac outside with central petal streaks from the petal base to tip of acumens. Berry unknown but the ovary is pyriform. This hybridogenic species known with the vernacular name of *Papa de Monte* or *Papa Chavela* has $2n = 36$ chromosomes.

Distribution: Found only in Montes de Nahuasú, at 3400 m alt., between Monte Negro and Salado, just above and behind the small waterfall in front of the village of Baños. Living in cloud forest associated with trees (*Cedrela*, *Cecropia*, *Juglans*) and shrubs (*Chusquea*, *Lupinus*, several species of Melastomataceae, orchids and ferns).

Solanum correlli Ochoa, American Potato J. 58(5):223-225. 1981.

Plant tall, up to 2 m high, suffrutescent. Tubers usually moniliform. Leaves sparsely pilose, 3-4 pairs of leaflets, shortly petiolulate, (1-)2-3(-4) pairs of interjected sessile leaflets. Leaflets ovate to ovate-lanceolate. Calyx 5.5-6.0 mm with linear acumens 1.5-2.0 mm long. Corolla rather rotate-pentagonal than rotate, lilac, 3.0-3.5 cm in diameter. Berries ovoid to globose. Chromosome number: $2n = 24$, EBN = 2.

Distribution: So far found only near the shores of the Angas River, to an altitude of 2700 m, Chimborazo Province. In margins of humid forests or shrubby thickets.

Solanum minutifoliolum Correll, *Wrightia* 2:191. 1961.

Plant stout, erect, usually 30-60 cm tall, densely pilose. Tubers ovate, white. Leaves subcoriaceous, dark green and coarsely pubescent on upper surface, pale green, finely pubescent on lower surface, 1-2(-3) pairs of elliptic-lanceolate shortly petiolulate leaflets and numerous to multiple several sizes of interjected leaflets, from (6-9-)11-20 (-26) pairs often minute, subimbricated and mostly suborbicular. Terminal leaflet broader and longer than the lateral. Peduncle densely hirsute. Corolla substellate, deep purple, 2.5 cm in diameter. Berries globose to slightly ovoid, 1.5 cm in diameter. It is quite resistant to late blight caused by *Phytophthora infestans*. Chromosome number: $2n = 24$, EBN = 1.

Distribution: Found in the provinces of Cañar, Chimborazo, and Tungurahua, occurs at elevations between 2800-3100 m alt., mainly in cloud forest, in shrubby thickets or margins of woods associated with ferns, orchids, *Fuchsia*, *Oxalis*, *Calceolaria*, Melastomataceae, and many Compositae.

Solanum regularifolium Correll, *Wrightia* 2:194. 1961.

Plant very simple, 50-70 cm tall, sparsely pubescent throughout. Tubers white-yellowish, round to ovate, 3-4 cm. Leaves 3-4(-5) pairs of leaflets without interjected leaflets, leaflets sessile to shortly petiolulate, elliptic to elliptic-lanceolate, apex subacute to obtuse, base mostly rounded and oblique. Corolla pentagonal, light blue with white acumens, 2.5-3.0 cm in diameter. Calyx strongly asymmetric, very pubescent, 7 mm long, linear acumens. Chromosome number: $2n = 24$. Very susceptible to *Phytophthora infestans* in plant and tubers.

Distribution: Very limited, I found it only near the type locality, south of Guasuntos, Iltus, en route Riobamba towards Cañar, 2400 m alt., Chimborazo Province. The collection *Correll & Smith P827*, made near Olmos on road to Jaen, Department Lambayeque, Perú, determined by Correll as *Solanum regularifolium*, in my opinion, belongs to *S.*

huancabambense Ochoa. The habitat of *S. regularifolium* is a narrow and very dry valley, with poor vegetation. I saw there only a few Gramineae and some trees of *Schinus molle* L.

Solanum suffrutescens Correll, *Wrightia* 2:183-184. 1961.

Solanum cyanophyllum Correll, *Wrightia* 2:180. 1961.

Plant shrubby, very branched, slightly pubescent. Stem subterete, slightly woody, strongly pigmented with reddish-brown. Tubers round or long subcylindrical up to 8 cm long and 1.5 cm thick. Leaves with narrow wings on the rachis, 3-4(-5) pairs of leaflets and (2-)5-7(-8) pairs of interjected decurrent leaflets, leaflets sessile to shortly petiolulate, elliptic-lanceolate with acute or shortly acuminate apex, base obliquely rounded. Calyx asymmetrical, narrowed lobes, linear acumens. Corolla rotate-pentagonal, 2.5-2.8 cm in diameter, deep purple to lilac, 2.5-3.0 cm in diameter. Berries ovoid to subglobose. Chromosome number: $2n = 24$, EBN = 2.

Distribution: In Ecuador, between Magdalena and Balzapampa, mainly in the hills of Samosurco and Pisco-urco, also in Panjor and Guamote, at 2600-3700 m alt., Bolívar Province. In wet thickets of valleys and near páramos in edges of woods, frequently associated with *Salvia*, *Calceolaria*, *Chusquea*, *Rubus*, Compositae, and several species of grasses.

V. *Solanum* series *Piurana* Hawkes, *Ann. Mag. Nat. Hist.*, Ser. 12. 7:693. 1954.

Solanum chilliasense Ochoa, *Lorentzia* 4:9-11. 1981.

Plant about 1 m tall, glabrous or glabrescent throughout. Tubers small, round to ovate, 1.0-2.0 cm long, white. Leaves dark green and subvernigose above, light green and opaque below, 2-3 pairs of shortly petiolulate leaflets and (1-)2-3 pairs of interjected sessile leaflets; terminal leaflet widely elliptic to elliptic-lanceolate with acuminate apex, much larger than the laterals. Corolla rotate, lilac with white acumens, 1.8-2.5 cm in diameter. Berries ovoid, 1.5-2.0 cm long. This species presents a type of hypersensitive

reaction to the attack of *Phytophthora infestans*, therefore, it is highly valuable for potato breeding programs dealing with major genes of resistance (*R*). Chromosome number: $2n = 24$, EBN = 2.

Distribution: So far has been found only in the vicinities of Cordillera de Chilla, between Burro Urco and Chilola, at 3450 m alt., El Oro Province. Usually in cold foggy places or cloud forest among shrubby thickets or edges of woods.

Solanum solisii Hawkes, Bull. Imp. Bur. Pl. Breed. & Genet., Cambridge. 125-156. 1944.

Plant small, 30-40 cm tall, bushy, branched and rosette near base, glabrescent to sparsely pilose throughout. Tubers small, 1.0-3.0 cm, round and white. Leaves with little shine, 1-2(-3) pairs of sessile leaflets, usually without interjected leaflets, terminal leaflet larger than the laterals, elliptic to broadly elliptic-lanceolate, lateral leaflets elliptic. Corolla lilac (2.0-)2.5-3.5 cm in diameter, rotate with short and wide acumens with deep interpetalar notches giving an outline of multilobulate aspect. Berries ovoid to long-ovoid, 1.5-2.0 cm long.

Distribution: From central to south Ecuador, in the provinces of Tungurahua, Cañar, and Azuay, between 3500-4000 m alt., especially in thickets of high altitude páramos and grassy meadows.

Solanum tuquerrense Hawkes, Ann. Mag. Nat. Hist., Ser. 12. 7:693-697. 1954.

Plant robust, 50-60(-80) cm tall, glabrous or glabrescent throughout. Tubers long, cylindrical or subcylindrical up to 8 cm long, whitish. Leaves olive-green vernicose above, pale green and opaque below, (2-)3-5 pairs of slightly revolute leaflets, interjected leaflets few to many (1-2-)4-8(-11) pairs, sessile or decurrent on the narrowly winged rachis. Lateral leaflets broadly elliptic or ovate-lanceolate to narrowly elliptic-lanceolate with acute or shortly acuminate apex, subsessile. Terminal leaflet larger than laterals. Corolla rotate to rotate-pentagonal, blue-purple or violet purple, 2.5-3.5 cm in diameter. Berries long-ovoid to long-conical, 3 cm long and 1.7 cm broad. Chromosome number: $2n = 48$. EBN = 2.

Distribution: From Department Nariño, south of Colombia to the provinces of Carchi, Imbabura, Pichincha, Cotopaxi, and Napo in northern Ecuador at elevations between 3000-3450 m. Occurs in cold places, grassy meadows, wet thickets or edges of woods.

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